Risk perception and influenza vaccination coverage among medical and dental students

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Citation

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Abstract

Objectives: Influenza viruses are highly contagious. Medical and dental students are at risk of occupational exposure to influenza and their risk of infection is greater compared to the general population.The aim of the study was to characterize the risk perception and behavior modification of medical and dental students due to the emergence of a novel influenza virus. Furthermore, we evaluate attitudes concerning the seasonal and swine flu vaccination and vaccination rates.Methods: A survey was conducted among medical and dental students, using an anonymous questionnaire, at a medical school during a flu vaccination campaign.Results: Overall, 40.1% of the medical and 36% of the dental students of the clinical part of the Frankfurt Medical School (n = 571/1,450) took part in the vaccination campaign and completed the anonymous questionnaire. The main reason for compliance with the seasonal and swine flu vaccination was the protection of patients (cited by over 90% of the students). Most of the students stated that the risk of occupational exposure to and subsequent contraction of seasonal and H1N1/2009 influenza ("swine flu") is elevated in comparison with the entire population. However, more than half of the students did not change their "risk-prevention" behavior owing to the emergence of the novel influenza virus H1N1/2009.Conclusions: Encouraging medical students to be vaccinated against flu and the implementation of an education program which emphasizes that the need for personal precautions and physical interventions ought to play a vital role in stopping the transmission, thereby reducing institutional outbreaks and minimizing the burden of influenza-like illnesses among students.

INTRODUCTION

Health Care Workers (HCWs) are at risk of occupational exposure to influenza [1,2]. Previous studies demonstrated that 24.1% of students experienced at least one influenza-like illness during influenza seasons [3]. The recent introduction of the novel influenza A/H1N1 virus ("swine flu") raised concern regarding the safety of HCWs [4,5]. Beyond that, HCWs are the most significant reservoirs for nosocomial transmission of influenza in hospitals [6,7]. Therefore, since 1988 the Standing Committee on Vaccination (STIKO) at the German Robert Koch-Institute (RKI) has recommended that HCWs be vaccinated against influenza to limit the spread of the illness between medical personnel and patients, as well as to reduce staff illness and absenteeism during the influenza period. Nevertheless, compliance rates with influenza vaccination among HCWs remain low [8-12].

Medical and dental students belong to a group of HCWs that is frequently exposed to patients with potentially occupationally-transmissible infectious diseases. Previous studies among college and university students have shown that influenza vaccination was associated with a substantial reduction in influenza-like illness and that influenza vaccination of students is associated with significant health and university performance benefits [3,13].

The purpose of the present study was to ascertain the vaccination rates and beliefs of medical and dental students concerning the seasonal and swine flu vaccination. Furthermore, we assessed the risk perception and behavior modification due to the emergence of a novel influenza virus.

METHODS

STUDY POPULATION

At the Frankfurt medical school there are approximately 3,300 medical and dental students, including 1,200 medical and 250 dental students who are in the clinical phase of their studies.

The university hospital offers seasonal and H1N1/2009 vaccinations free of charge to medical and dental students

who are in the clinical phase of their studies (n = 1,450).

A flu vaccination campaign for students was initiated from the beginning of November to the end of November 2009, with several immunization dates at the Occupational Health Service, in the lecture building and in the dental hospital.

The vaccinated students were asked to complete an anonymous questionnaire.

. QUESTIONNAIRE

The questionnaire comprised 10 questions divided into five areas of inquiry:

- Demographic data: age, sex, number of clinical semesters, field of study
- Kind of administered vaccination (seasonal flu and/or swine flu shot)
- Flu vaccination status in the past, and perceived barriers to previous influenza vaccination
- Reasons for accepting influenza vaccination
- Risk perception and behavior modification due to the emergence of a novel influenza virus

ETHICAL CONSIDERATIONS

Participants were informed that all the information gathered would be anonymous and kept confidential. Participation was voluntary, completion of the questionnaire implied consent for study participation. Participants cannot be identified from the material presented and the study has caused no plausible harm to the participating individuals.

STATISTICAL ANALYSIS

Statistical analysis of the data and calculation of p values were calculated with χ^2 test two-tailed, using the BiAS program for Windows 9.04 (Epsilon Verlag, Hochheim Darmstadt 2007). P values < 0.05 were defined as statistically significant.

RESULTS

Overall, 40.1% of the medical and 36% of the dental students of the clinical part of the Frankfurt medical school (n = 571/1,450) took part in the vaccination campaign and completed the anonymous questionnaire. Only two medical students refused to fill out the questionnaire.

In total, 64.4% (n = 368) of the participants were female, 35.6% (n = 203) male, in accordance with the gender distribution of the student body. Demographic characteristics of the study population are shown in Table 1.

Figure 1

Table 1: Demographic characteristics of participants (n = 571)

Age	[%]	n
less than 20	0.18	1
21-30	92.1	526
31-40	7.2	41
over 40	0.53	3
Gender		
Male	35.6	203
Female	64.4	368
Field of study		
Medical students	84.2	481
Dental students	15.8	90

Since only students who took part on the questionnaire could be evaluated, the following analysis is limited to the 571 participants. Overall, 81.4% (n = 465) of the students were vaccinated against swine flu, and 51.1% (n = 292) received the swine flu and seasonal influenza vaccination. In total, 69.7% (n = 398) of the students were vaccinated against seasonal influenza.

Medical students demonstrated a higher vaccination rate with both vaccines compared to dental students (54.9% vs. 31.1%; p < 0.001), while dental students were significantly more often vaccinated against the seasonal flu alone (p < 0.001). When comparing the overall vaccination rate against the seasonal flu, no significant differences could be highlighted (76.7% vs. 68.4%; p = 0.117). Vaccination rates are summarized in Table 2.

Figure 2

Table 2: Vaccination rates among respondents, medical students (n = 481 / 1,200) and dental students (n = 90 / 250)

	Overall (n = 571)	Medical students (n = 481)	Dental students (n = 90)	p-value
Swine flu and seasonal flu vaccination	51.1%	54.9%	31.1%	P < 0.001
Swine flu vaccination	30.3%	31.6%	23.3%	P = 0.117
Seasonal flu vaccination	18.6%	13.5%	45.6%	P < 0.001

In total, 57.8% (n = 330) of the participants had never had a flu vaccination in the past, 20.3% (n = 116) were vaccinated against flu on a single occasion, and 21.9% (n = 125) frequently received the flu vaccine.

Reasons mentioned for compliance with seasonal and swine flu vaccination (See Table 3) were primarily protection of patients (stated by over 90% of the students), and self-protection (stated by over 70%). Concern for their family, friends and colleagues took third place. These results were broadly similar for medical and dental students. Only for swine flu vaccination did significantly more medical students declare the reason for vaccination as being the protection of their families and friends (p = 0.003). Significant more dental students noted that they had refused previous seasonal influenza vaccination because they had thought that the "vaccine does not work" (p = 0.038), or they had feared side effects (p = 0.038) or they were convinced that the vaccine could cause flu (p < 0.001).

Figure 3

Table 3: Reasons cited for acceptance and refusal of seasonal and swine flu vaccination (n = 571) – multiple answers were possible

Reasons for acceptance	Overall (n = 571)	Medical students (n = 481)	Dental students (n = 90)	p-value
Seasonal flu vaccination				
Patient protection	91.4%	92.5%	85.6%	P = 0.031
Self protection	71.8%	70.5%	78.9%	P = 0.104
Protection of family and friends	62.3%	63.6%	55.6%	P = 0.147
Swine flu vaccination				
Patient protection	90.2%	91.1%	85.6%	P = 0.107
Self protection	76.2%	77.1%	71.1%	P = 0.219
Protection of family and friends	62.0%	64.7%	47.8%	P = 0.003
Reasons for refusal of previous seasonal flu vaccinations				
No personal risk	20.5%	19.8%	24.4%	P = 0.311
No severity of influenza illness	10.9%	10.2%	14.4%	P = 0.233
Vaccine does not work	3.2%	2.5%	6.7%	P = 0.038
Fear of side effects	9.6%	8.5%	15.6%	P = 0.038
Fear of needles	0.9%	1.0%	0.0%	P = 0.331
Vaccine causes flu	3.3%	2.1%	10.0%	P < 0.001
Forgotten	8.9%	9.1%	7.8%	P = 0.676
Not offered at the university	15.6%	16.4%	11.1%	P = 0.202

Approximately 90% of medical and dental students stated that the risk of occupational exposure to and subsequent contraction of seasonal and H1N1 influenza was elevated in comparison with the entire population (see Table 4).

Figure 4

Table 4: Risk perception concerning seasonal and H1N1/2009 influenza (n = 571)

Seasonal flu	Overall (n = 571)	Medical students (n = 481)	Dental students (n = 90)	p-value
Risk of infection is elevated	89.5%	89.4%	90.0%	P = 0.864
Risk of infection is the same	8.4%	8.5%	7.8%	P = 0.815
Risk of infection is lower	0.2%	0.2%	0.0%	P = 0.665
Don't know	1.9%	1.9%	2.2%	P = 0.824
Swine flu				
Risk of infection is elevated	90.0%	90.2%	88.9%	P = 0.697
Risk of infection is the same	6.1%	6.4%	4.4%	P = 0.468
Risk of infection is lower	0.4%	0.2%	1.1%	P = 0.183
Don't know	3.5%	3.1%	5.6%	P = 0.248

In total, 56% (n = 320) of the students did not change their "risk-prevention" behavior due to the emergence of the novel influenza virus H1N1/2009. Notably, 40.6% (n = 232) stated that they washed their hands more often and 6% (n = 34) tried to avoid gathering, 6.7% (n = 38) stopped handshaking and 3.2% (n = 18) bought masks, disinfectants and/or antiviral drugs. There were statistically significant differences between medical and dental students regarding their behavior modification. More medical than dental students did not change their behavior ($p < 0.001$), while significantly more dental students washed their hands more often ($p < 0.001$), avoided gatherings ($p = 0.024$) and increased the frequency of wearing masks ($p < 0.001$) (see Table 5).

Figure 5

Table 5: Behavior modification due to the emergence of H1N1/2009 influenza (n = 571).

	Overall (n = 571)	Medical students (n = 481)	Dental students (n = 90)	p-value
Hand washing	40.6%	36.6%	62.2%	P < 0.001
Gathering	6.0%	5.0%	11.1%	P = 0.024
Handshaking	6.7%	6.0%	10.0%	P = 0.165
Mask	3.2%	2.1%	8.9%	P < 0.001
No change	56.0%	59.7%	36.7%	P < 0.001

DISCUSSION

Our study is the first study to look at risk perception for seasonal and H1N1/2009 influenza infection in medical students. We examined risk perception, immunization rates, and behavior modification due to the emergence of a novel influenza virus. We built and expanded on our past work by examining a new population (medical and dental students) [9,14].

In our previous studies on HCWs, self-protection was the most frequently cited reason for receiving the flu vaccine [9,14]. Notwithstanding, the medical students mentioned the reduction of the risk to infect patients as the most important motivation associated with seasonal and swine flu vaccine uptake (see Table 3). This illustrates the consciousness of students being aware of their potential contribution to influenza transmission to patients.

Medical students are, during their clerkships and internships, commonly responsible for the collection of blood samples from a whole ward, and therefore they come into contact with many or all patients of the department. Their unique profile makes them potential "superspreaders" for e.g. aerogen-transmitted infectious diseases [15]. The immunization of medical students might be highly effective in preventing nosocomial influenza outbreaks, because they belong to an age group with high infection rates of H1N1/2009 [16].

Evidence from the past few months demonstrates that the H1N1/2009 virus has rapidly established itself and is now the dominant influenza strain in most parts of the world [16].

Vaccination seems to be the best defense against high infection rates among susceptible and vulnerable people. However, physical interventions (e.g. personal hygiene,

barriers, and distancing) are effective against the spread of a broad range of respiratory viruses and ought not be neglected. One major problem with physical measures is poor compliance because all physical interventions (e.g. washing hands frequently, wearing masks, gloves, and gowns) require a change in behavior [17]. However, a recently published study revealed that simple hand washing with unmedicated soap and water appears to be highly effective in removing the influenza virus and is, therefore, likely to be effective in preventing the transmission of influenza by smear infection [18].

A study from the University of Alberta in Canada found that 93.5% of medical students believed that hand washing was an effective preventive measure in limiting the spread of influenza. However, it is important to note, that there is a difference between students knowing (data from the University of Canada) and complying with preventive measures (our data) [19].

Most of the medical and dental students stated that their risk of acquiring a seasonal or swine flu infection was elevated due to their professional life.

Nevertheless, 56% of participating students stated that they did not change their behavior due to the emergence of the novel influenza virus. Merely 40.6% mentioned that they washed their hands more frequently, there seems to be a discrepancy resulting from inconsistency between student's beliefs and student's actions.

There are major similarities between medical and dental students, but there are some differences. First, medical students exhibited a higher vaccination rate compared with dental students. Second, significantly more medical than dental students declared the reason for their swine flu vaccination was the protection of their families and friends ($p = 0.003$). Third, while significantly more dental students had refused previous seasonal influenza vaccination because of misinformation ("vaccine does not work; vaccine causes flu; relevant side effects"), with the appearance of the pandemic flu, this seems to have changed to a certain extent so that they now show a higher risk perception and a significantly higher rate in the modification of their "risk-prevention" behavior compared with medical students.

LIMITATIONS

To appreciate the results of our study, some potential limitations need to be addressed:

First, the results from a single academic institution may not be applicable to other institutions.

Second, the "social desirability bias", (i.e. selecting a choice of answers considered as being the most "socially favorable") may lead to bias in our survey, which may affect the reliability of some of the answers.

Third, because of the restricted observed time frame (November 2 until November 30, 2009); we were unable to measure whether the actions and beliefs of the students varied during the entire influenza season due to the number of reported influenza infections and owing to the changing awareness of media and public sentiment. However, the vaccination campaign started on November 2, and all official immunization dates were until November 30, 2009. All students might have been able to keep a vaccination appointment, but it is likely that some of the students failed to meet the deadline.

Fourth, the number of students who received their flu vaccination from their general practitioner could not be calculated.

However, only few studies deal with the occupational risk of infection among medical students who belong, obviously, to a group of workers who are at greater risk of infection compared to the general population. Most of the previous studies focused on hospital-based HCWs (e.g. physicians, nurses). Our study is the first study that has evaluated the influenza vaccination rate, the risk perception and behavior modification among German medical and dental students due to the emergence of a novel influenza virus (H1N1/2009). Albeit, nearly 90% of medical and dental students stated that the risk of occupational exposure to and subsequent contraction of seasonal and H1N1 influenza was elevated in comparison with the entire population, more than half of the students did not change their "risk-prevention" behavior owing to the emergence of the novel influenza virus H1N1/2009.

The results of our study underscore the need for ongoing focus on and evaluation of strategies to reduce the transmission of flu among HCWs. Further work is needed to highlight the important role of physical measures such as hand washing and wearing masks. Strategies to increase influenza vaccination uptake among medical and dental students ought to be implemented in order to protect the students and patients from influenza [20].

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